Model 31 Chronology Ray Wagner, 4-11-90

In 1938, San Diego's Consolidated Aircraft, today called the Convair Division of General Dynamics, wanted to relace its successful PBY flying boat with a new design. Reuben Fleet, the company president, envisioned a radical new prototype, the Model 31 flying boat.

That design, by Chief Engineer Isaac Machlin Laddon, was going to be the fastest flying boat in the world. Everything would be new- wing section, power plant, and hull shape. It used a long narrow wing with an airfoil section invented by David R. Davis. Wind tunnel tests at Cal Tech on this wing indicated a lower drag effect than usual, so Consolidated had bought exclusive rights to use the Davis airfoil for a year, beginning in February 1938.

The twin-engined Model 31 was also the first aircraft to employ the Wright R-3350 Duplex Cyclone, the engine that would eventually power the B-29, although in 1939 that powerplant was far from ready for production. This engine was rated at 2000 hp at 2400 rpm for takeoff, but was limited to 1900 hp at 2200 rpm with the 16′ Hamilton three-bladed hydromatic propellers. Normal ratings were 1700 hp at 6,200′, or 1500 hp at 15,600′. Total fuel capacity was 5430 gallons in integral wing tanks.

April 18, 1938: First GALCIT wind tunnel test of "Model X".
June 8, 1938: Model X estimates- 2/R-3350, 22,274 lb empty
Top speed at 31,500 lb. 270 mph at 15,000′.
" " " 50,000 " 258 "
June 17, 1938: Photo of Wind Tunnel Model of "Model X" patrol bomber.
July 6, Prototype authorized by I.B. Laddon. C. Burr Carroll is project engineer. This prototype would be built as a test vehicle, while the company prepared patrol bomber and transport versions.
Aug 3: GALCIT wind tunnel test of Model 31.

February 1, 1939: Model 31 patrol bomber proposal, 5 guns, 4.000 lb. bombs, 47,216 lb. gross weight.
April 21: Model 31 passenger proposal, 32 night, 50 day.
May 5, 1939: First flight of NX21731 from San Diego bay. One hour, 22 minutes by William Wheatley, along with George Newman, Jack Kline, and Bob Keith. Gross weight 33,040 lbs. This same crew would make the first XB-24 flight on December 29. Wheatley would be the pilot of the first 43 Model 31 flights.

Two decks in narrow deep hull
Retractable tricycle beaching gear, retractable floats
Wing 110′ span, 14′ chord, 1048 sq. ft., AR 11.53, Fowler flaps
Length 72′,6", height 23′4" on beaching gear
Hull was 69′10", 15′5" deep, 9′2" beam
Horizontal tail orginally 22′ wide, increased later to 26′.

July 14, 1939: Flight Test #13 at 37,600 lb. Top speed calculated as 267 mph at 15,000′, and 237 mph at sea level. Right engine malfunction after 1 hr., 25 min.
August 3 & 9: new wind tunnel tests at GALCIT.
August 15: Test #14; 35,586 lb., with 42 changes, including new R-3350 A71 right engine and fixed wing slots installed. High speed 270 mph @ 15,000′.
August 25: Test #16, 42,000 lbs. Left float tore off and tail damaged during test landing.

September 20: Wind tunnel test at GALCIT.
October 3: Photos with raised tail.
October 5: Test #17. Raised and rebuilt horizontal stabilizer with center cutout and two trim tabs. Elevator area increased from 44 to 64.8 sq. ft., empty weight increased 223 lbs.
October 30: Flt. 21 at 35,630 lb. Top speed of 263 mph @ 15.000′.
November 20: " 26 " 35,125 " with new elevator, 66.5 sq. ft. Buffeting continues.
December 1. Flt. 28 at 35.470 lb. Top speed was 266 mph at 15,000′.
December 4: Photo with modified tail, fin area added to center.
" 21 flt. #30 at 35,500 lb. and 20" hull extension behind elevator.

This experience indicated the original 22′ span elevator design for the XB-24 was inadequate, and the twin tail had to be redesigned. So that the first XB-24 flight could be made befor the first of the year, the Model 31 tail was removed and placed on the XB-24, apparently only for the short first flight, wheels down, on December 29.

January 2, 1940: Model 31 Flt. #31 with elevator island span increased to 34" and toe in vertical fins. Followed by a series of taxi tests.
January 12. Flt. #32
January 18. Flt. #33 with XB-24 vertical tail (of XB-24 flight #2) and Curtiss electric propellers installed. More rudder area.
January 24: Photo of a/c with Curtiss props.
February 19: Flt. #34 with Model 31 vertical tail, elevator & nacelle changes.
Feb 23: Flt. #35 with Hamilton props replacing Curtiss.
" 27: " #37 with closed wing slots
" 28: " #38 " open " " slots cost 2.5 mph in high speed. (235 mph, cf 237.5 @ sea level, but improved aileron control and reduced wing tip stall.
Feb 28: Flt. #38 at 44,063 lb., 238 mph at sea level with 1700 hp each engine.
March 1: Wind tunnel test at GALCIT. Afterwards, CAC used its own tunnel.
March 9: Photo of new cowl & air scoops.
March 11: Flt. #41 @ 35,300 lb. with original nacelles; high speed was 235 mph at sea level, 255 mph @ 9,600′, 258 mph @ 15,000′, 266 mph @ 18,000′.
March 25: Flt. #42 @ 40,350 lb.; 1st Navy demonstration, for Cmdr. Goodney
March 26: " #43 @ 46,350 " 2nd " "
" 27 " #44 @ 46,435 " 1st Navy Trail Board, 2 hr. 28 min.
" 28 " #45 @ 46,620 " 2nd " " " High speed measured at 230 mph at sea level, 245 mph @ 6,600′, 255 mph @ 15,000′, 258 mph @ 16,600′, and service ceiling was 24,500′.
March 29: Flt. #47 @ 46,480 lb.. 4th Navy Board; High speed measured at 232 mph at sea level, 247 mph @ 6,600′, 253 mph @ 15,000′, 256 mph @ 16,600′, and service ceiling was 24,500′.
April 1: Photo of Model 31 with dummy turret.
" " Flt. 50 is 7th Trail Board flt. Dummy turret reduced speed 2.5 mph.
" 2: " 51 " 8th " " ", takeoff tests @ 48,377 lb. gross. Model 31 has 59 hr. 52 min. flight time to this date.
April 18, 1940: Proposal for patrol bomber with three power turrets (nose, retractable top, and tail), armor, and self-sealing tanks.

Eight crewmen, 45,000 lb., 26′ tail span.

(April 30: Photo of Model 31 in flight, no turret.)

March 7, 1941: Photo of Model 31 in flight with dummy turrets.

Feb 17, 1942: BuAirC Farnsworth memo. approves procurement of Model 31.
April 13, 1942: Navy accepts Model 31 for conversion to XP4Y-1.
April 20: Spec. SD-320 for XP4Y-1 conversion of Model 31. NXs-4578 con.
April 22 to May 2: Test flights by Russ Rogers and R.A. McMachin.
July 8: Navy contract NOa(s)-259 for 200 P4Y-1 to be built at New Orleans.
Oct 27: Photos of XP4Y-1 bow turret mockup with 37 mm. gun and radar.
Oct 29: Navy authorized 200 P4Y
Nov 9, 1942: Spec SD-320-1 for 200 P4Y-1, Na 8855 authorises production.
December 12: P4Y-1 proposal; 2,300 hp R-3350-8, Curtiss props, 46-48,000 gross weight, seven men, one 37 mm, four .50 caliber, 2,600 lb DC,
July 1943: XP4Y-1 27852 completed. Delivery scheduled for Nov. 30.
September 11, 1943. P4Y-1 program cancelled, replaced by 200 PBY.

Sources:

Consolidated A/c Corp. Flight Test Record, Model 31 Flying Boat SDAM TL684.2 C65.
_____ Consolidator August 1938: 2.
_____ Consolidator June 1939: 4-5.
_____"Model X Patrol Bomber" June 8,1939. SDAM Vertical file.
Guggenheim Aeronautical Laboratory, California Institute of Technology, "A Historical Listing of Tests carried out at the GALCIT's 10 Foot wind tunnel". May 1988
C. Hansen, AAHS Journal Summer 82: 136-147; History, Descrip., Photos.
William Wagner, Reuben Fleet 1976: 203-206, 218.
SDAM files also include photographs, design proposals, etc.
Flight logbooks:
R.A. McMachin:"31X" 1941 August 15, 16, 20.
XP4Y-1 1942 April 30 50 m. test
" " May 2
Russ Rogers " " April 22,(1:50) 24 (.45)
Bill Chana " " " 24, 26.
E.D. Shannon " 1943 July 5 test, 1:37 hrs,
" " July 7 to Aug. 24, 14 test flts. 42+ hrs.